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Elliott Microturbines

Absorption Chiller Integrated System Development

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Overview

- Introduction
- Elliott TA100 CHP System
- Direct Fired Absorption Chillers
- System Integration
- Test Results
- Lessons learned
- Future Work
- Installations – Ebara MGT Group

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Introduction

- Commercial Launch of the TA-80 MonoGen system was geared towards support of Solution Providers and tailored installations.
- Complexity and redundancy has been eliminated with the launch of the TA100 CHP system while significantly reducing installation time and footprint.
- EESI Customers are now looking at more complex Building Integrated systems that incorporate Direct Fired Chillers.

TA100 Integrated CHP Package

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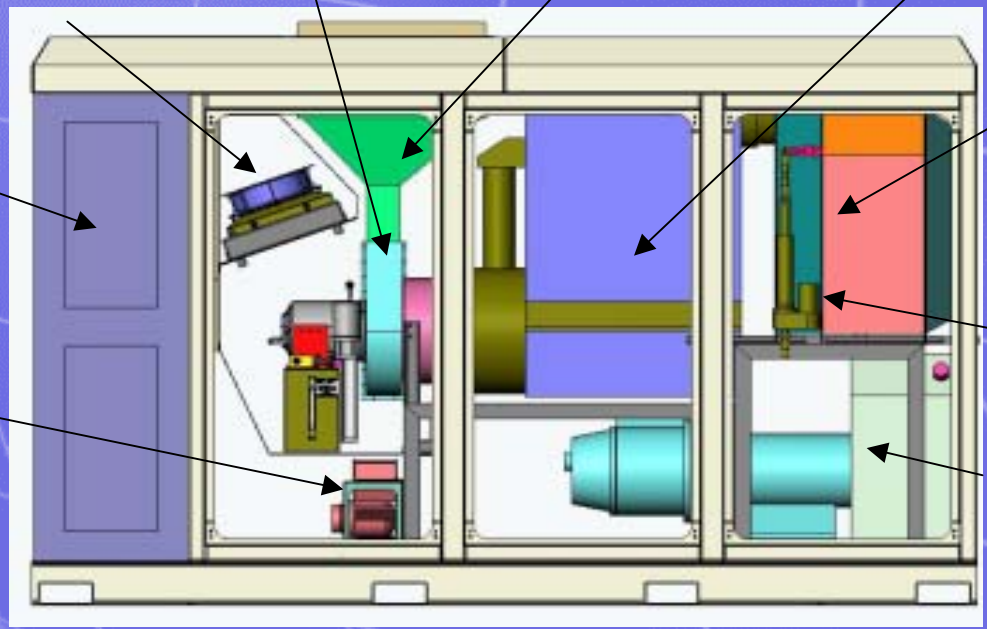
Dimensions:

Height:	78 in	Net Power Output:	100 kWe (ISO)
Width:	33 in	Thermal Output:	172 kW (net)
Length:	120 in	Exhaust Temp.	535 deg-F (ISO)
Dry Weight:	4000 lbs	Fuel Input Flow:	22.0 scfm



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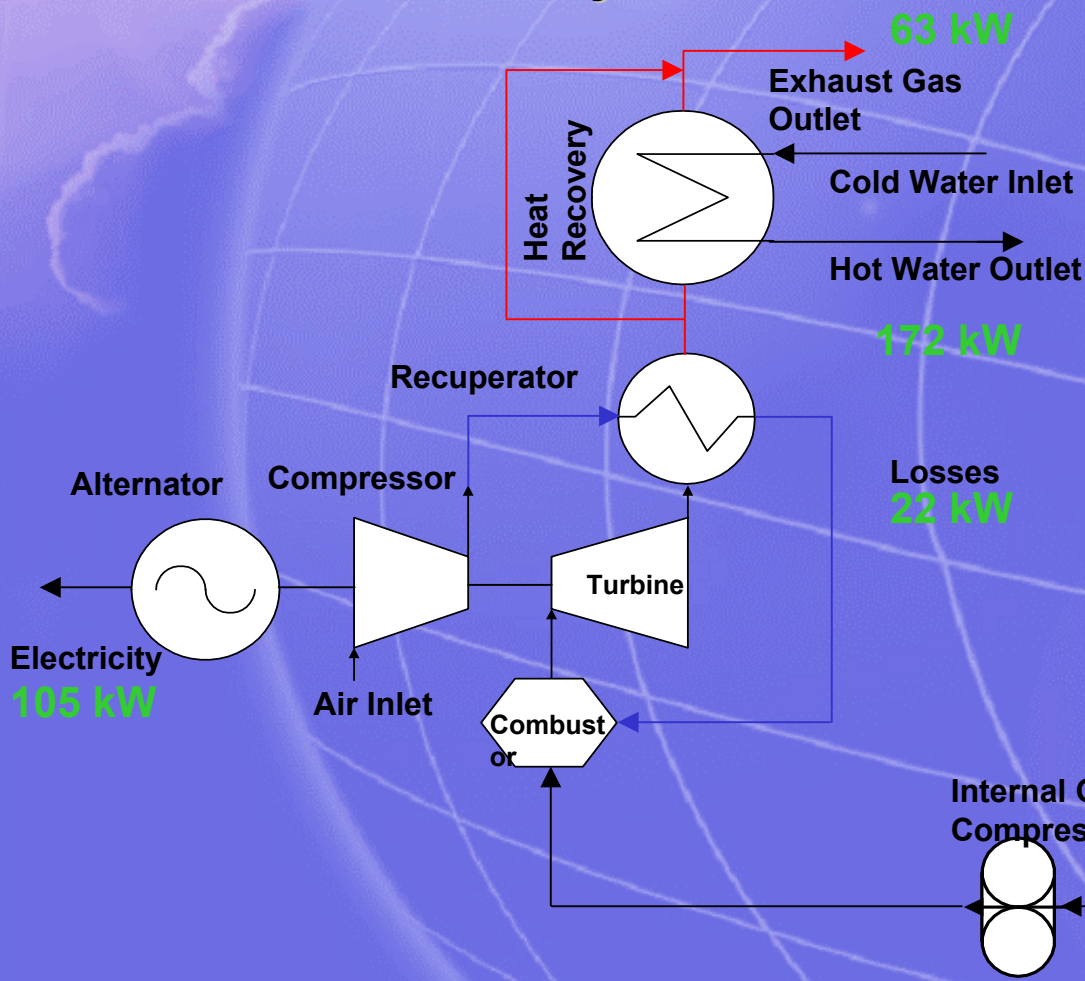
Microturbine

Elliott TA100 CHP Schematic

- CHP Efficiency 75%
- MonoGen Efficiency 29%

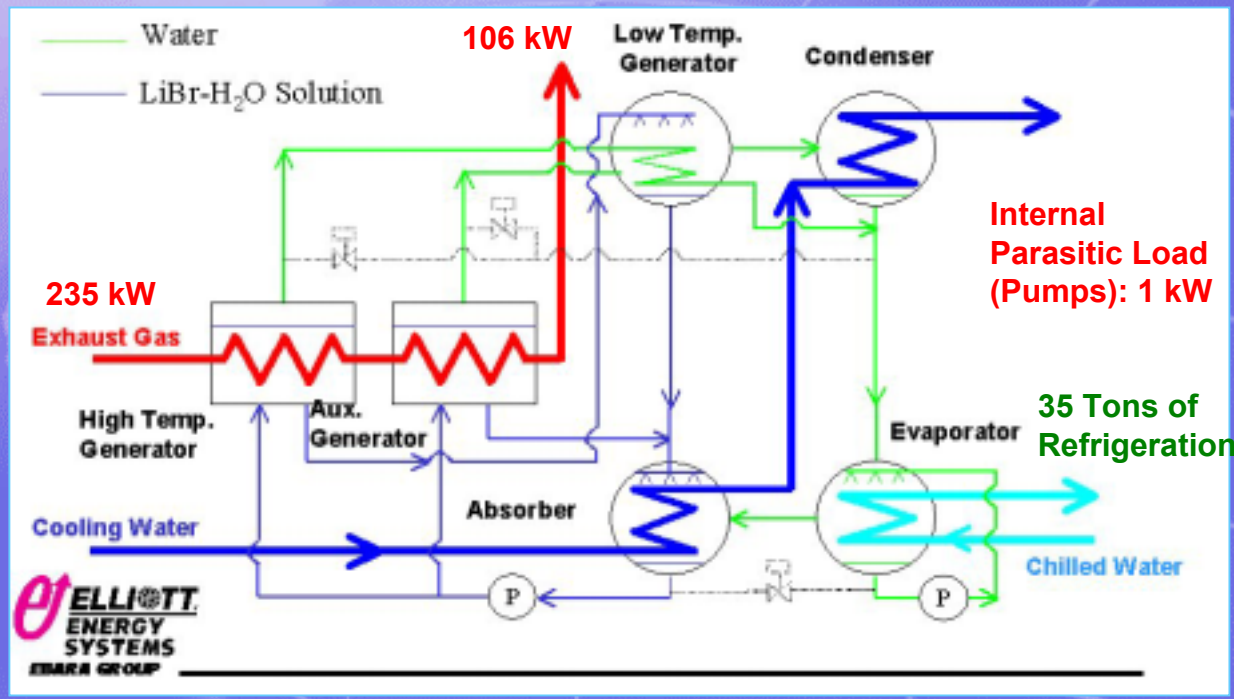
At ISO conditions:

- 100 kW (Net) Electrical
- 172 kW Hot Water



Direct Fired Absorption Chillers

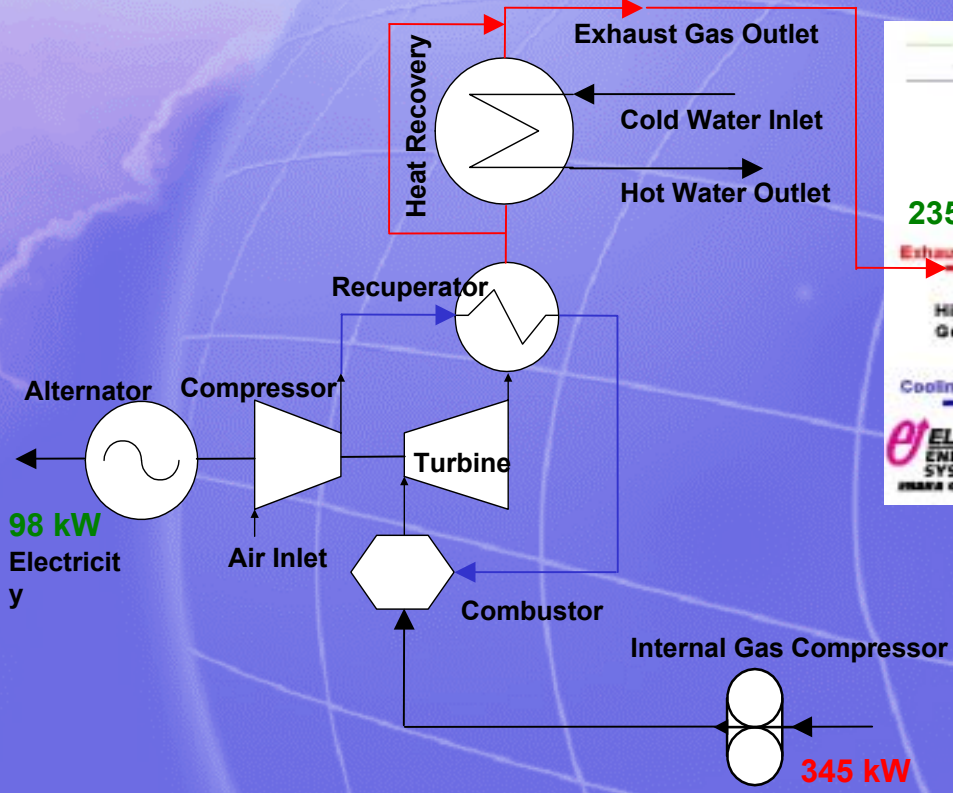
Single-Double Effect, (SDE), Absorption Chiller

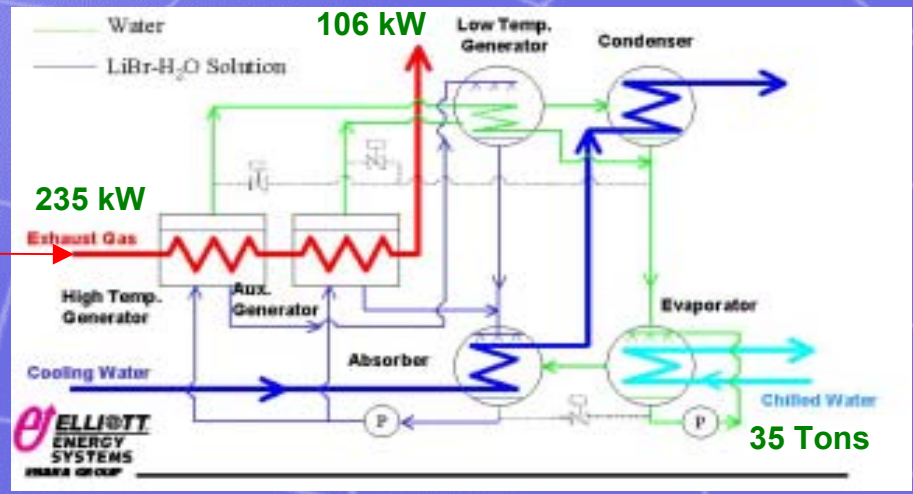


- 35 Tons of Cooling Capacity
- COP = 1.03
- Integral damper included
- Solution temperature monitoring as Safety Device

System Integration

Elliott TA100 CHP –SDE Absorption Chiller Integration

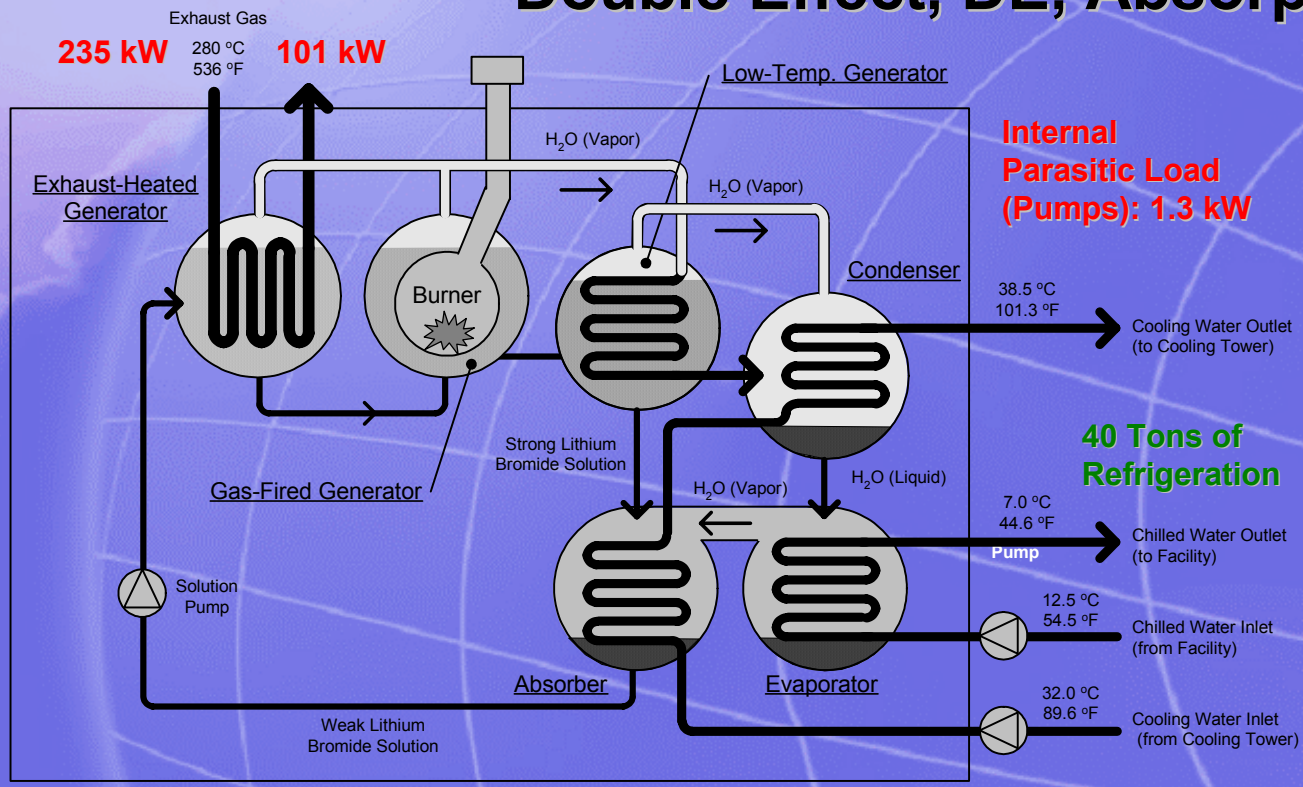




- Overall Efficiency 63 % @ 70F
- Generating hot water simultaneously reduces cooling capacity of absorption chiller

Direct Fired Absorption Chillers

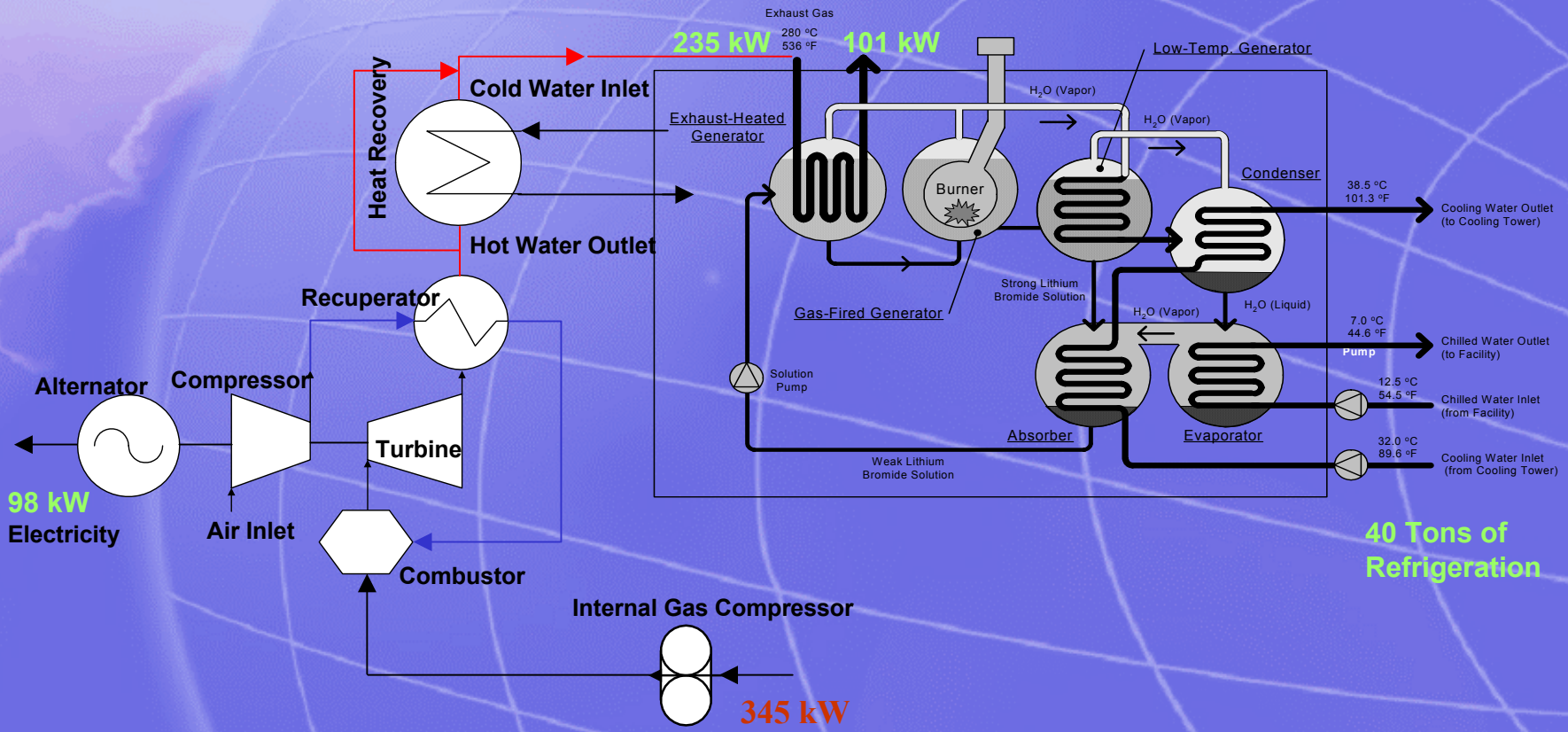
Double Effect, DE, Absorption Chiller



- 40 Tons of cooling capacity
- COP = 1.04
- Dual Fired System (Burner)
- Vacuum reset two/three times a year
- Internally pressurized in damper by-pass
- Damper and damper controller are not included

System Integration

Elliott TA100 CHP – DE Absorption Chiller Integration



- Overall Cycle Efficiency 67 % @ 70F
- Dual Fired Absorption Chiller integrated with TA100 CHP allows cooling continuously (Burner) while simultaneously creating hot water.

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Elliott TA100 CHP SDE Absorption Chiller EESI Integration

System used to supply 59F air to test cell for ISO standard day testing.

TA100 MonoGen - DE Absorption Chiller Integration (Sodegaura Plant)

Test Parameters

- System start-up transient.
- Chiller Cooling Performance at different MGT output power.
- Chiller Heating Performance at different MGT output power.

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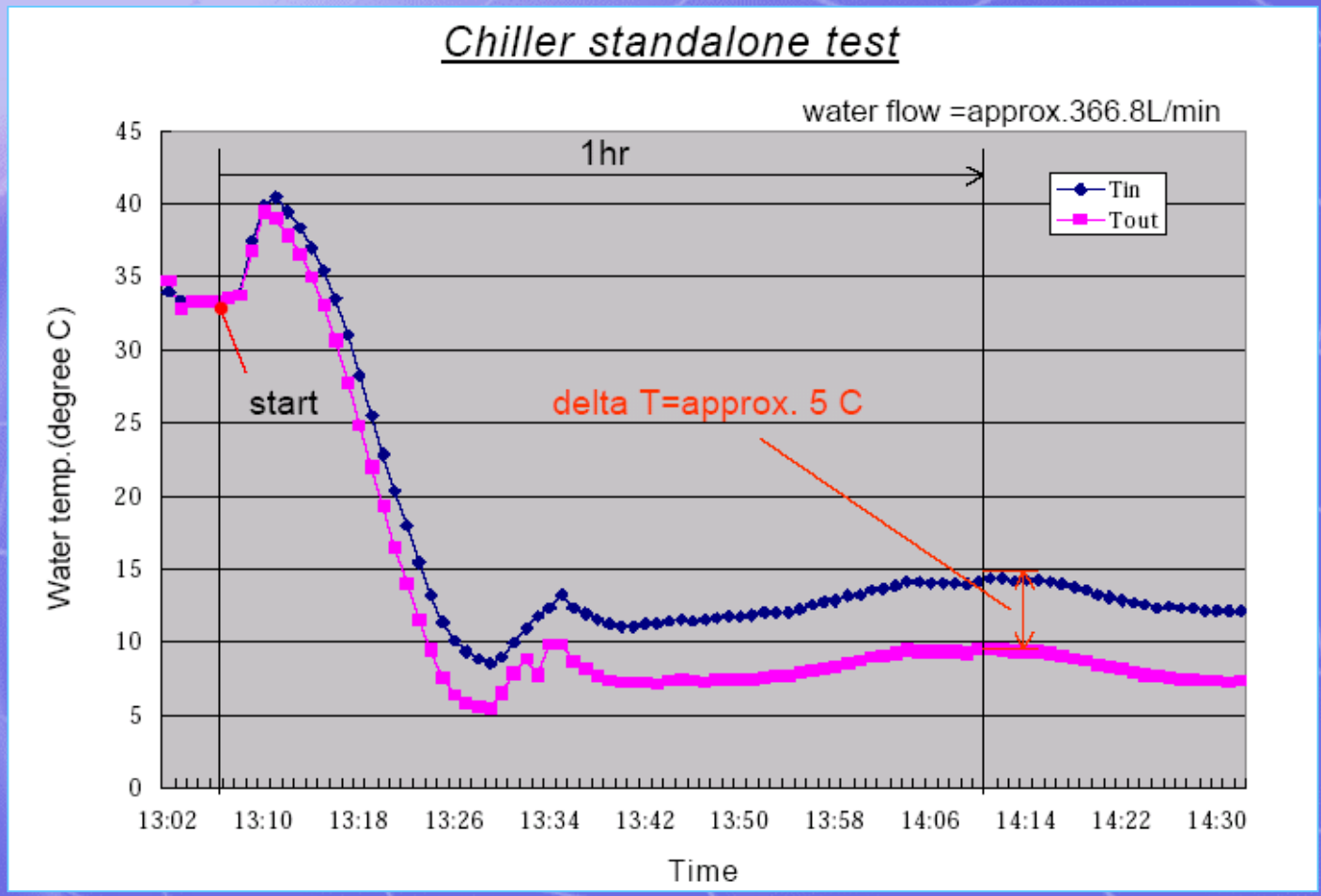
Elliott TA100 CHP - DE Absorption Chiller Integration (EESI Plant)

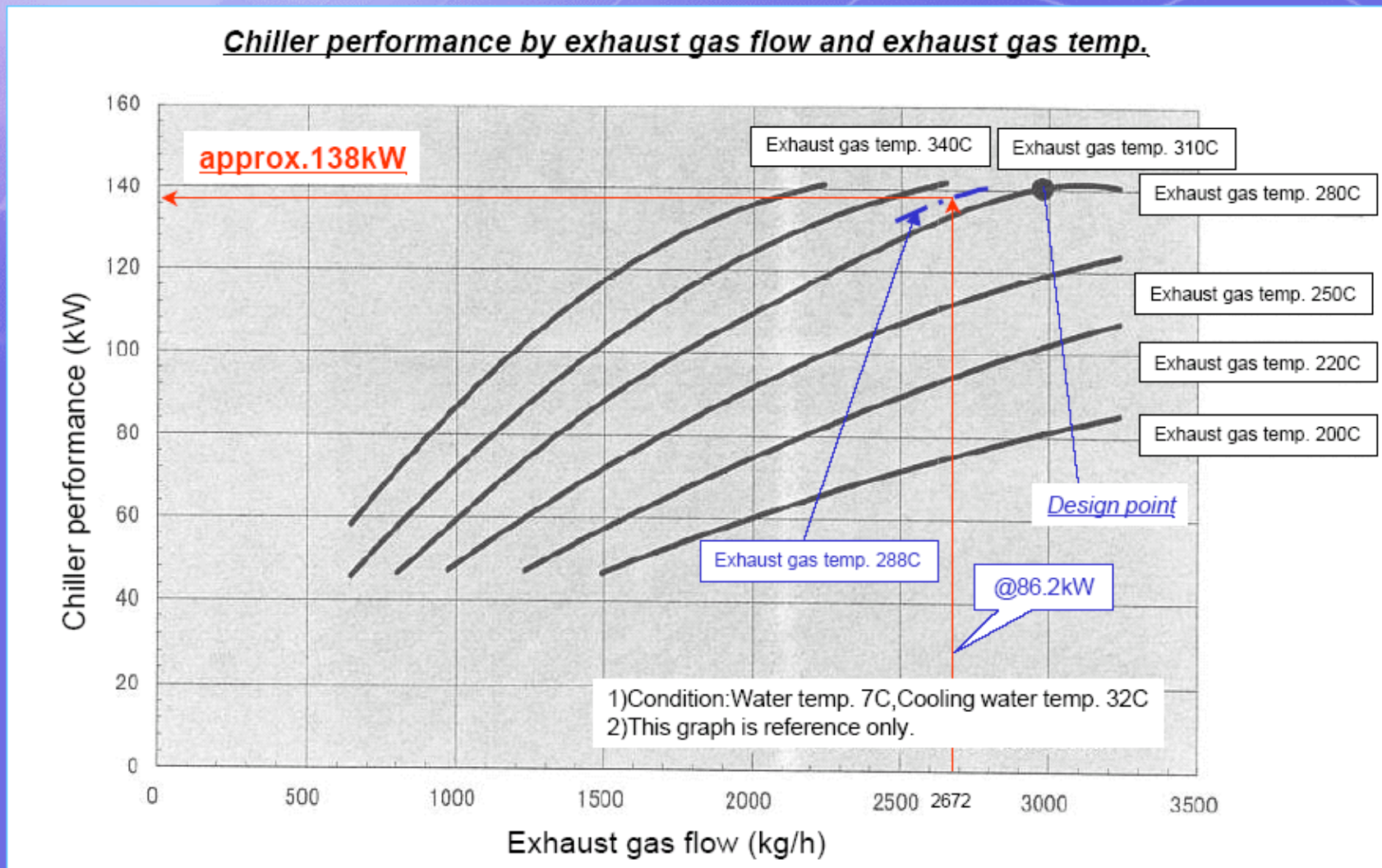
TA100 Monogen – DE Result (Sodegaura Plant)



Measurement shows that it took one (1) hour to have 0 to 40 tons of cooling with burner

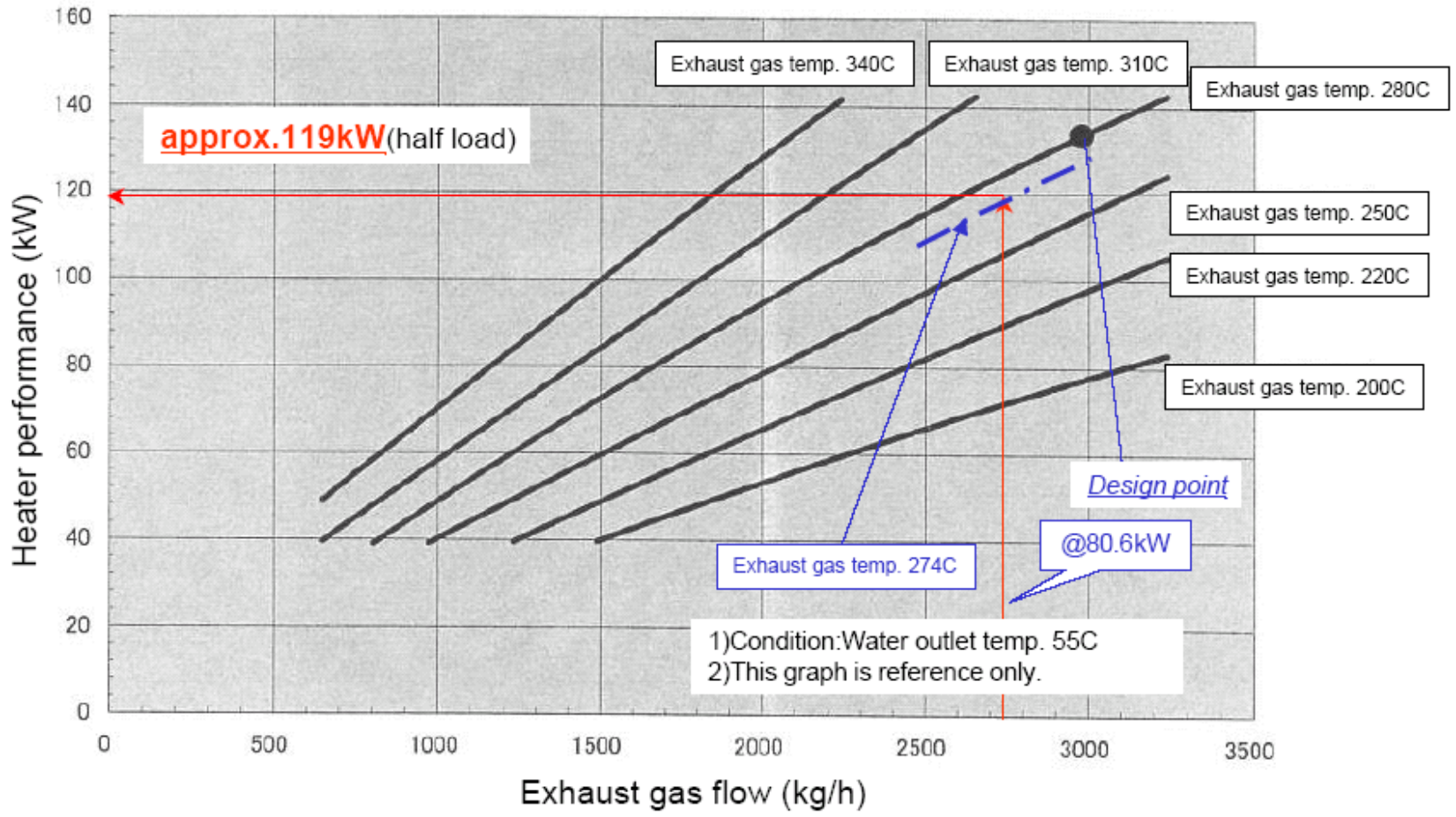
TA100 Monogen – DE Result (Sodegaura Plant)

Cooling Performance



TA100 Monogen – DE Result (Sodegaura Plant)

Heating Performance



Lessons Learned

- Overall DE system efficiency, Cooling Mode, tested at 64%
- Overall DE system efficiency, Heating Mode, tested at 60%
- For heating purposes, TA100 CHP package operates at 75%.
- Maintenance requirements vary significantly between manufacturers and should be closely considered. Impact will depend on Customers experience.
- Chiller protection methodologies vary between manufacturers, that can impact operational characteristics of the system.
- Chiller/CHP integration involves a totally new set of skills, Building Management integration, Water treatment, heat rejection.

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Future Work

- Completing the TA100 CHP – DE Absorption Chiller installation at EESI for partial thermal load testing, and endurance testing.
- Develop and optimize “integration kits” for BCHP solutions.
- Support Customer Installations to increase total system knowledge for cost, permitting, and installation improvements.
- Review Economic benefit of Integrating Desiccant System.

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TA 100 (80) Monogen. + Exhaust Gas Absorption Chiller

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TA80 Monogen. + Exhaust Gas Absorption Chiller

TA80 Hot Water Cogen. + Hot Water Absorption Chiller

Master Control Panel

TA80 Hot Water Cogen. + Hot Water Absorption Chiller

3 Units inside the Soundproof Wall

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TA80 Monogen. + Steam Boiler

Digestion Gas TA80 Hot Water Cogeneration

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2004 is full of Potential

Customers have caught up to the Technology

The solutions they are looking for are complex

It is up to “us” to deliver